Precalc Warm Up # 3-2

Solve:

1. $2x^2 - 9x + 4 > 0$

2. $6x^2 + 11x + 1 < 0$

Simplify:

3. $\left(\dfrac{3z^2x^{-2}}{z^5}\right)^{-3}$

4. $27^{\frac{-2}{3}}$

5. $\sqrt[4]{64x^3y^4z^{14}p^{24}}$

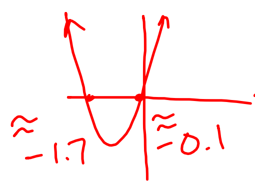
Precalc Warm Up # 3-2

Solve:

1. $2x^2 - 9x + 4 > 0$

$(-\infty, \frac{1}{2}) \cup (4, \infty)$

2. $6x^2 + 11x + 1 < 0$



use grapher!

$\approx -1.7 < x < -0.1$

Simplify:

3. $\left(\dfrac{3z^2x^{-2}}{z^5}\right)^{-3}$

$\dfrac{x^6z^9}{27}$

4. $27^{\frac{-2}{3}}$

$\left(\dfrac{1}{27}\right)^{2/3}$

$\dfrac{1}{9}$

5. $\sqrt[4]{64x^3y^4z^{14}p^{24}}$

$2|yz^3|p^6\sqrt[4]{4x^3z^2}$

HW Questions?

EXERCISES 2.4.4

1. Solve the following pairs of simultaneous equations.

(a) $y = 2x + 1$
$y = x^2 + 2x - 3$

(j) $x - y = 1$
$y = x^2 + x - 5$

2. Solve the following simultaneous equations

(a) $y = x^2 - 4x + 7$
$y = 2x^2 + 2x$

(d) $y = 4x^2 + 3ax - 2a^2$
$-(y = 2x^2 + 2ax - a^2)$

$0 = 2x^2 + ax - a^2$

$0 = (2x - a)(x + a)$

$x = \frac{a}{2}, -a$

$\left(\frac{a}{2}, \frac{a^2}{2}\right)$

$(-a,$

$y = 2\left(\frac{a}{2}\right)^2 + \frac{\cancel{2}a}{1}\left(\frac{a}{\cancel{2}}\right) - a^2$

$= \frac{\cancel{2}}{1} \cdot \frac{a^2}{\cancel{4}_2} + a^2 - a^2$

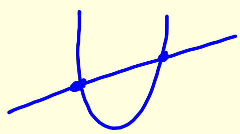
$= \frac{a^2}{2}$ ... now plug in $x = -a$

3. For what value(s) of m will the straight line with equation $y = mx - 6$

(a) touch (b) intersect (c) never meet

the parabola with equation $y = x^2$.

$b^2 - 4ac > 0$



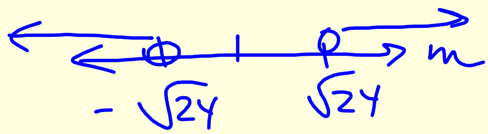
$x^2 = mx - 6$

$x^2 - mx + 6 = 0$

$(-m)^2 - 4(1)(6) > 0$

$m^2 - 24 > 0$

$\sqrt{m^2} > \sqrt{24}$



$|m| > \sqrt{24}$

4. Find the distance between the points of intersection of the line with equation $y = 2x + 1$ and the parabola with equation $y = x^2 - 4x + 6$.

$2x + 1 = x^2 - 4x + 6$

$0 = x^2 - 6x + 5$

$0 = (x - 5)(x - 1)$

$(5, 11)$

$(1, 3)$

solve to get x values for the points of intersection.

Plug in to find y, then

distance formula $\}$ $d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

5. Find the value of a such that the line $y = 2x + a$ has exactly one intersection point with the parabola with equation $y = x^2 + 3x + 2$.

$b^2 - 4ac = 0$

$$x^2 + 3x + 2 = 2x + a$$

$$x^2 + \underset{b}{1}x + \underset{c}{(2 - a)} = 0$$

$$1 - 4(2 - a) = 0$$

$$1 - 8 + 4a = 0$$

$$\frac{4a}{4} = \frac{7}{4}$$

7. For what value(s) of k is the line $2x = 3y + k$ a tangent to the parabola $y = x^2 - 3x + 4$?

one pt in common

$b^2 - 4ac = 0$

$$3y = 2x - k$$

$$y = \frac{2}{3}x - \frac{k}{3}$$

$$3\left(\frac{2}{3}x - \frac{k}{3}\right) = \left(x^2 - 3x + 4\right)3$$

$$2x - k = 3x^2 - 9x + 12$$

$$0 = 3x^2 - 11x + (12 + k)$$

$$121 - 4(3)(12 + k) = 0$$

Today, PC Chapter 1:

Review Properties of Exponents and Radicals

Rational Exponents

Special Factor Patterns

Wed: Simplifying Rational Expressions and Compound Fraction Expressions

Thursday: Review

Friday Test:
SL Chapter 2 and PC Chapter 1

Example	Property
$2^3 \cdot 2^4 = 2\cdot2\cdot2\cdot2\cdot2\cdot2\cdot2$	$a^m a^n = a^{m+n}$
$\frac{2^5}{2^2} = \frac{2\cdot2\cdot2\cdot2\cdot2}{2\cdot2}$	$\frac{a^m}{a^n} = a^{m-n}$, $a \neq 0$
$\frac{2^2}{2^2} = 2^{2-2} = 2^0$	$a^0 = 1$, $a \neq 0$
$\frac{3^2}{3^5} = 3^{2-5} = 3^{-3} = \left(\frac{1}{3}\right)^3$	$a^{-m} = \left(\frac{1}{a}\right)^m$
$(3\cdot2)^4 =$	$(ab)^m = a^m \cdot b^m$
$\left(\frac{3}{2}\right)^4 =$	$\left(\frac{a}{b}\right)^m = \frac{a^m}{b^m}$, $b \neq 0$
$(3^2)^4 = 3^2 \cdot 3^2 \cdot 3^2 \cdot 3^2$ $= 3^8$	$(a^m)^n = a^{mn}$

Be careful! Although $(ab)^m = a^m b^m$ and $\left(\frac{a}{b}\right)^m = \frac{a^m}{b^m}$,

$(a+b)(a+b)$ $\boxed{(a + b)^m \neq a^m + b^m}$

Pascal's Triangle:

1
1 1
1 2 1
1 3 3 1
1 4 6 4 1
1 5 10 10 5 1

$(\quad)^2$

$(a + b)^2 = 1a^2 + 2ab + 1b^2$

$(a + b)^3 = 1a^3 + 3a^2b + 3ab^2 + 1b^3$

$= a^3 + 3a^2b + 3ab^2 + b^3$

$(a + b)^4 =$

Properties of Radicals
PC book page 17.

$$a^{\frac{m}{n}} = \sqrt[n]{a^m} = \left(\sqrt[n]{a}\right)^m$$

Find:

a. $32^{\frac{4}{5}}$

b. $\left(\frac{3x^3}{y^2}\right)^{-4} \cdot \frac{9xy^{-2}}{z^0} =$

c. $\frac{\sqrt[4]{729}}{\sqrt[4]{9}} =$

d. $\sqrt[3]{\sqrt{10}} =$

Properties of Radicals
PC book page 17.

$$a^{\frac{m}{n}} = \sqrt[n]{a^m} = \left(\sqrt[n]{a}\right)^m$$

Find:

a. $32^{\frac{4}{5}} = \left(\sqrt[5]{32}\right)^4$

$= 2^4$

$= 16$

b. $\left(\frac{3x^3}{y^2}\right)^{-4} \cdot \frac{9xy^{-2}}{z^0} =$

$\frac{y^8}{{}_9\cancel{81}x^{12}} \cdot \frac{\cancel{9}x}{y^2} = \boxed{\frac{y^6}{9x^{11}}}$

c. $\frac{\sqrt[4]{729}}{\sqrt[4]{9}} = \sqrt[4]{\frac{729}{9}}$

$= \sqrt[4]{81}$

$= 3$

d. $\sqrt[3]{\sqrt{10}} = \left(10^{\frac{1}{2}}\right)^{\frac{1}{3}}$

$= 10^{\frac{1}{6}}$

$= \sqrt[6]{10}$

$\left(\sqrt[n]{a}\right)^n = |a|$ If n is even. $\left(\sqrt[n]{a}\right)^n = a$ If n is odd.

Simplify:

a. $\sqrt{75x^2} =$

b. $\sqrt[3]{-24a^4c^8}$

c. $\sqrt[4]{\left(5x^2y^{-3}\right)^4} =$

$\left(\sqrt[n]{a}\right)^n = |a|$ If n is even. $\left(\sqrt[n]{a}\right)^n = a$ If n is odd.

Simplify: $\sqrt{x^2} = (\sqrt{x})^2 = |x|$

a. $\sqrt{75x^2} = 5|x|\sqrt{3}$

b. $\sqrt[3]{-24a^4c^8} = \sqrt[3]{-8 \cdot 3 \cdot a^3 \cdot a\,(c^2)^3 \cdot c^2}$

$= -2ac^2\sqrt[3]{3ac^2}$

c. $\sqrt[4]{\left(5x^2y^{-3}\right)^4} = \sqrt[4]{\frac{5^4(x^2)^4}{(y^3)^4}} = \frac{5x^2}{|y^3|}$

One last oddity...

$(-8)^{1/3} =$

$(-8)^{2/6} =$

Try to do this one in your head....

$(-32)^{-4/5}$

One last oddity...

$(-8)^{1/3} = \sqrt[3]{-8} = -2$

$\boxed{(-8)^{2/6}}$ = $\sqrt[6]{(-8)^2}$ $\left(\sqrt[6]{-8}\right)^2$ $(-8)^{1/3}$

undefined

$\sqrt[6]{64}$

2 $\qquad$ $\neq$ $\qquad$ -2

Try to do this one in your head....

$(-32)^{-4/5} = \dfrac{1}{16}$

Factoring Review

1. GCF Factor: $6y^3z - 4y^2z = 2y^2z(3y-2)$
2. DOS $a^2 - b^2 = (a + b)(a - b)$
3. DOC $a^3 - b^3 = (a - b)(a^2 + ab + b^2)$
   SOC $a^3 + b^3 = (a + b)(a^2 - ab + b^2)$
4. Perfect Square Trinomial: $a^2 + 2ab + b^2 = (a + b)^2$
   $a^2 - 2ab + b^2 = (a - b)^2$
5. Grouping:

Factor: $\underbrace{x^3 - 2x^2}\ \underbrace{-\ 3x + 6}$

$\underbrace{x^2(x-2)} - \underbrace{3(x-2)}$

* Make sure you can see 2 terms here!

factor out what they have in common the $(x-2)$

$(x-2)(x^2-3)$

Factor: $x^4 - 16$

Factor: $27a^3 - 1000\,b^6$

Factor: $-3x^3 - 24$

Factor: $x^4 - 16 = (x^2+4)(x^2-4)$

$= (x^2+4)(x-2)(x+2)$

Factor: $27a^3 - 1000\,b^6$ $(a-b)(a^2+ab+b^2)$

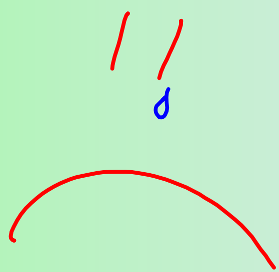
$(3a)^3 - (10b^2)^3 = (3a-10b^2)(9a^2-30ab^2+100b^4)$

Factor: $-3x^3 - 24 = -3(x^3+8)$

$= -3(x+2)(x^2-2x+4)$

Can't factor the SUM of SQUARES!

$$x^2 + 25 \neq (x + 5)^2$$



One last factor practice!

$$7(3x + 2)^2(1 - x)^2 + (3x + 2)(1 - x)^3$$

One last factor practice!

$$\underbrace{7(3x + 2)^2(1 - x)^2}\ +\ \underbrace{(3x + 2)(1 - x)^3}$$

Notice there are 2 terms!

Factor out GCF: $(3x+2)(1-x)^2\left[7(3x+2)+(1-x)\right]$

$(3x+2)(1-x)^2\left[21x+14+1-x\right]$

$(3x+2)(1-x)^2(20x+15)$

$(3x+2)(1-x)^2\,5(4x+3)$ Now re-organize

$$\boxed{5(1-x^2)(3x+2)(4x+3)}$$

HW: PC book

1.2: p. 26 #13-23 □, 41, 45-71 □

(when multiple parts, just do "a")

1.3: p. 39 #21, 25-45 □ , 53-79 □

Bring PC book the rest of the week.

Test Friday: SL 2 / PC 1